UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
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Seattle, WA 98115-0070

March 21, 2003

Thomas F. Mueller
Chief Regulatory Branch
Department of the Army
Seattle District Corps of Engineers
Post Office Box 3755
Seattle, Washington 98124-3755

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Army Corps of Engineers - Seattle District - Larson Bank Protection Project - Puyallup River - WRIA 10 - Consultation Number (NOAA Fisheries No. WSB-99-122)

Dear Mr. Mueller:

The attached document transmits the NOAA's National Marine Fisheries Service's (NOAA Fisheries) Biological Opinion (Opinion) on the emergency Larson Bank Protection Project in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531).

The U.S. Army Corps of Engineers (COE) determined in May 1999 that the proposed action was not likely to adversely affect Puget Sound (PS) chinook (*Oncorhynchus tshawytscha*). NOAA Fisheries did not concur with the initial effect determination and in December 2000 the COE re-submitted a Biological Assessment (BA) that determined that the proposed action was likely to adversely affect PS chinook. A second, revised BA that determined that the proposed action, although reduced in scope, was still likely to adversely affect PS chinook was submitted to NOAA Fisheries on August 7, 2002. Formal consultation was initiated on August 12, 2002.

This Opinion reflects formal consultation and an analysis of effects covering the above listed species in the Puyallup River and Kapowsin Creek near Orting, Washington. The Opinion is based on information provided in the final biological assessment received by NOAA Fisheries on August 7, 2002, and numerous telephone conversations, site visits, electronic mail, regular mail and facsimile transmittals received since June 1998 and continuing until October 2002. A complete administrative record of this consultation is on file at the Washington Habitat Branch Office.

NOAA Fisheries concludes that the implementation of the proposed project is not likely to jeopardize the continued existence of the above listed species or result in the destruction or adverse modification of their critical habitat. Please note that the incidental take statement, which includes reasonable and prudent measures and terms and conditions, was designed to minimize take. Please also note that an additional site review is required after the 2002-2003 flood season but before June 1, 2003. If you have any questions, please contact Steve Keller of the Washington Habitat Branch Office at (360) 534-9309.

Sincerely,

For Michael R Crouse

D. Robert Lohn
Regional Administrator

Enclosure

Endangered Species Act - Section 7 Consultation

BIOLOGICAL OPINION

and

Magnuson-Stevens Fishery Conservation and Management Act ESSENTIAL FISH HABITAT CONSULTATION

United States Army Corps of Engineers - Seattle District
Larson Bank Protection Project - Puyallup River
(WSB-99-122)

Action Agency: U. S. Army Corps of Engineers

Consultation Conducted by: NOAA's National Marine Fisheries Service
Northwest Region
Washington State Habitat Branch

Approved by: For Michael R Crouse

Date Issued: March 21, 2003

D. Robert Lohn
Regional Administrator

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1.0 INTRODUCTION

This document has been prepared in response to a request for consultation under the Endangered Species Act (ESA) of 1973, as amended, 16 U.S.C. 1531, *et. seq*. and transmits the NOAA's National Marine Fisheries Service (NOAA Fisheries) Biological Opinion (Opinion) and Magnuson-Stevens Fishery Management and Conservation Act (MSA) Essential Fish Habitat (EFH) consultation based on our review of the effects of a bank stabilization project on the Puyallup River. This project was declared a flood emergency by the U.S. Army Corps of Engineers (COE) in November 1995 under PL 84-99. After numerous discussions and correspondence, the project was finally constructed in 2002, still under the 1995 flood emergency authorization. The project site is in Pierce County, Washington, within the Evolutionarily Significant Unit (ESU) of the threatened Puget Sound (PS) chinook salmon *(Oncorhynchus tshawytscha)*. The Puyallup River is also EFH for chinook, coho *(O. kisutch)* and PS pink salmon *(O. gorbuscha)*.

1.1 Background and Consultation History

The U.S. Army Corps of Engineers (COE) proposed in 1998 to issue and administer a contract to a private contractor for the purpose of constructing an approximately 500 lineal foot rock riprap bank protection project (revetment) to protect the toe of an eroding bluff on the left bank of the Puyallup River (looking downstream). The site is at the confluence of Kapowsin Creek with the Puyallup River (River Mile [RM] 27.5) and about five miles upstream and south of the City of Orting. Flood events in 1995 and 1996 destroyed a portion of an existing river levee, allowing the river to course against and erode the bluff adjacent to Orville Road. The COE did not propose to repair the damaged levee, but without this revetment project the COE stated that Orville Road would be in jeopardy of failure from future flood events.

The COE designated this project as a flood emergency in November 1995 under PL 84-99. After numerous discussions and letters from NOAA Fisheries, the COE constructed a much shorter project (about 160 lineal feet) during the summer of 2002 under the same emergency authorization. Since an acceptable Biological Assessment (BA) was not received until August 7, 2002, formal consultation did not begin until August 12, 2002. The project began under emergency authorization on August 19, 2002, leaving insufficient time to complete formal consultation before the project began. However, this combined ESA/EFH consultation has been completed to document the effects of the emergency project on PS chinook salmon (ESA and EFH), PS pink salmon and coho salmon (both EFH only) and to provide additional post-project minimization measures necessary to address those effects.

NOAA Fisheries' consultation on this project began in June, 1998 with the receipt of an Environmental Assessment (EA) from the COE for the "Larson Bank Protection Project" on the Puyallup River near Orting, Washington, followed by numerous discussions that lead to three revisions of the Biological Assessment (BA). The final BA that described a significantly scaled back project was accepted on August 12, 2003, at which time formal consultation began. The emergency project was constructed in August 2002. The complete consultation history for this project is documented in the administrative record.

This Opinion reflects the results of the consultation process. The consultation process involved correspondence and site reviews as well as numerous telephone conversations between NOAA Fisheries and the COE, Pierce County, the Puyallup Tribe of Indians (PTI), the Washington Department of Fish and Wildlife (WDFW), and the U.S. Fish and Wildlife Service (USFWS). The objective of this Opinion is to determine whether the proposed project is likely to jeopardize the continued existence of PS chinook salmon, which occur in the project area. This consultation is conducted pursuant to section 7(a)(2) of the ESA and its implementing regulations (50 CFR 402). The objective of the EFH consultation is to determine whether the proposed project will adversely affect designated EFH, and if so, provide conservation measures to minimize those effects.

1.2 Description of the Emergency Action

The COE constructed a 160 lineal-foot bank stabilization project under its emergency authorities stated in PL 84-99. The construction occurred during the period August 19 to September 1, 2002. The project was built in lieu of rebuilding a flood-damaged levee section along the Puyallup River that was damaged during November 1995 and February 1996 flood events. The levee adjacent to Orville Road in the project vicinity was scoured, breached, and destroyed for approximately 1,500 linear feet. Without the levee in place, the toe of the slope below Orville Road was considered by the COE to be subject to erosion and undermining during high flow events. Before the levee was destroyed, Kapowsin Creek entered the Puyallup River from behind the levee at its downstream terminus. Currently, Kapowsin Creek flows on about the same alignment, but now courses across a Puyallup River bar and along the base of the Orville Road bank (approximately 45 feet below the road itself). Therefore while, the project directly affected the "channel" of Kapowsin Creek, the project is actually within the bankfull width of the Puyallup River.

The bank was reshaped to a two-to-one slope (horizontal to vertical) and the toe and lower bank (about 15 feet of slope distance) was armored with large rock riprap. The project was built from below the road and required a temporary diversion of Kapowsin Creek away from the revetment site and across a gravel bar to the river. This was because steep slopes prohibited access from above and dewatering the work area would substantially expedite the work schedule and significantly reduce downstream turbidity and sedimentation. The project site was accessed from a point about 1,500 feet upstream on the river and generally along the top of the remaining levee section. Brush and young alder trees along the top of the levee were removed and the surface was graded to allow equipment to be driven to the site. Kapowsin Creek was diverted to avoid in-water construction and releases of sediment into the Puyallup River. Fish were salvaged from the dewatered reach and relocated in Kapowsin Creek above the project site. Work was accomplished as intended during the period when adult and juvenile chinook were least likely to be present and no PS chinook were taken during the fish salvage efforts. A temporary culvert was installed in the diversion channel to allow equipment access across the Puyallup River gravel bar to the toe of the slope.

The revetment was placed on a slope that consisted of granular material (including a coal seam and bedrock), therefore no gravel filter was required. The revetment site was grubbed and several of the trees removed were stockpiled onsite and later placed along the face of the revetment. The revetment and toe consisted of Class IV rock riprap. Soil lifts were to be alternated between riprap layers as the project progressed up the slope and willow and red osier dogwood layers were to be placed in these lifts. A layer of soil was intended to be placed on top of the riprap but that was apparently not accomplished. Planting of native tree species (mainly willow and red-osier dogwood, and some conifers) was done to replace vegetation lost due to clearing (over a 0.22 acre area). At the toe of the revetment approximately five pieces of large woody debris (LWD) approximately 12 to 18 inches in diameter at breast height (dbh) each were placed to provide fish habitat along the bank. The logs had root wads attached and were over 30 feet long. These logs were anchored on the surface of the toe and anchored with rock riprap. Additional logs with rootwads attached were placed between these "groins" but not anchored. At the downstream end of the project, to offset the encroachment (10 feet) on the Kapowsin Creek channel, the right bank of the channel was regraded onto the existing gravel bar to increase channel width. A French drain was added to the upper slope to remove subsurface water from the slope. This water will discharge into the revetment. A woody debris matrix was placed on the bar adjacent to the mouth of Kapowsin Creek, but not at the immediate end of the left bank levee on the bar between the Puyallup River and the mouth of Kapowsin Creek as intended. This matrix contained 12 sound conifer trees approximately 18 inches dbh and 20 feet long with attached root wads. The matrix was placed with the root wads facing upstream and the bolls embedded within the bar to a point below scour depth at a 100-year flood event. The matrix consisted of four sets of three trees placed in contact and arranged in a downstream direction. However the sets of trees were dispersed further apart than the plans described.

A few coho salmon fry were salvaged from the temporary diversion channel after the revetment was completed and flow was redirected into the original channel. At the completion of the project, the disturbed slopes were hydro-seeded for erosion control, the bar was regraded as necessary to prevent stranding of juvenile fish and the top of the levee access road was hydro-seeded and re-vegetated for erosion control. A derelict culvert installed in a back-channel behind the upstream end of the levee was also removed and the culvert crossing point was reshaped and re-vegetated.

The following measures were recommended just prior to, and during construction to minimize the effects of the emergency construction:

1) The location and dimensions of the proposed project shall be limited to that necessary to provide reasonable protection to the integrity of the bank and the slope adjacent to Orville Road and to off-set project impacts on salmonid habitat.

2) The proposed project shall be constructed during the time of year when flows in Kapowsin Creek and the Puyallup River are at or near their lowest level, when weather conditions are usually driest, and when there is a very low or no likelihood of encountering salmonid smolts or adult salmonids on the project site.

3) The proposed project shall be constructed in a manner that will minimize instream and riparian impacts to the maximum extent practicable. Minimization measures shall also include habitat improvements on and near the bank protection project.

4) The site of the proposed project and its access road shall be stabilized and re-vegetated to provide for the proper protection of ESA and EFH fish life and

habitat.

1.3 Description of the Action Area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). Direct effects occur at the project site and may extend upstream or downstream based on the potential for impairing fish passage, hydraulics, sediment and pollutant discharge, and the extent of riparian habitat modifications. Indirect affects may occur throughout the watershed where actions lead to additional activities or affect ecological functions contributing to stream degradation. For this consultation, the action area includes the affected streambed, bankline, adjacent riparian zone, and aquatic areas of Kapowsin Creek from its mouth upstream approximately 1,500 feet at the bridge crossing of Orville Road, and within the Puyallup River from a point approximately 1,500 feet upstream of the site and approximately 1,500 feet downstream where Orville Road crosses the river.

2.0 ENDANGERED SPECIES ACT

The Endangered Species Act (ESA) of 1973, as amended, establishes a national program for the conservation of threatened and endangered species of fish, wildlife, and plants and the habitat on which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with USFWS and NOAA Fisheries, as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or to adversely modify or destroy their designated critical habitats. This Opinion is the product of an interagency consultation pursuant to Section 7(a)(2) of the ESA and implementing regulations found at 50 CFR Part 402.

2.1 Biological Opinion

2.1.1 Status of the Species

NOAA Fisheries considers the current status of the listed species, taking into account population size, trends, distribution, and genetic diversity. To assess the current status of the listed species within the action area, NOAA Fisheries starts with the determinations made in its decision to list for ESA protection the ESU considered in this Opinion and also considers any new data that is relevant to the determination. NOAA Fisheries completed a status review of chinook salmon from Washington, Idaho, Oregon, and California in 1998, which identified 15 distinct species (termed ESUs) of chinook salmon in the region (Myers *et al.* 1998). After assessing information concerning chinook salmon abundance, distribution, population trends, risks, and protection efforts, NOAA Fisheries determined that chinook salmon in the Puget Sound ESU are at risk of becoming endangered in the foreseeable future. Subsequently, NOAA Fisheries listed PS chinook salmon as threatened (64 FR14308, March 24, 1999). Prohibitions against take were applied later (July 10, 2000, 65 FR 42422).

The Puget Sound ESU is a complex of many individual populations of naturally spawning chinook salmon, and 36 hatchery populations (March 24, 1999, 64 FR 14308). Recently, NOAA Fisheries' Puget Sound Technical Recovery Team (PSTRT 2001) tentatively identified

21 geographically distinct populations of chinook salmon in Puget Sound. Through the recovery planning process NOAA Fisheries will define how many and which naturally spawning populations of chinook salmon are necessary for the recovery of the ESU as a whole (McElhany *et al.* 2000). In addition, five hatchery stocks are considered essential to the recovery of PS chinook salmon. The listed hatchery stocks are: Kendall Creek (spring run), North Fork Stillaguamish River (summer run), White River (spring run), Dungeness River (spring run), and Elwha River (fall run) (March 1999, 64 FR 14308).

In most streams in Puget Sound, chinook abundance is declining. Overall abundance of chinook salmon in this ESU has declined substantially from historical levels and many populations are so small that genetic and demographic risks of extinction of these populations are likely to be relatively high. Migratory blockages and degradation of freshwater habitat, especially in upper river reaches, has contributed to these reduced abundances. Widespread agriculture and urbanization have significantly altered the complexity of freshwater and estuarine habitats used by chinook salmon. Spring- and summer-run chinook salmon populations through the Puget Sound ESU have been particularly affected. These life histories have exhibited widespread declines throughout the ESU and some runs are believed extinct (Nehlsen *et al.* 1991; March 1999, 64 FR 14308). These losses represent a significant reduction in the life history diversity of this ESU (March 1999, 64 FR 14308).

Chinook spawning behavior is similar to that of other salmonids. The female selects an appropriate stream location over gravel and small cobble substrate where she excavates the spawning nest (redd). After spawning, females have been reported to remain on the redd from 4 to 26 days until they die or become too weak to hold in the current (Neilson and Green 1981, Neilson and Banford 1983). During this period, females will vigorously defend the redd against the spawning activity of newly arriving fish. Duration of incubation varies, depending on location of redds, but is generally completed by the end of February. Young chinook reside in stream gravels for two-to-three weeks after hatching (Wydoski and Whitney 1979) before moving to lateral stream habitats (e.g., sloughs, side channels, and pools) for refugia and food during their migration downstream to the ocean. Peak emigration occurs from March to June.

Chinook are anadromous and semelparous. Within this general life history strategy, however, chinook display a broad array of tactics that includes variation in age at seaward migration, variation in length of freshwater, estuarine, and oceanic residence, variation in ocean distribution and ocean migratory patterns, and variation in age and season of spawning migration. In an extensive review of the literature, Healey (1991) used differences in life history patterns to divide eastern Pacific chinook salmon into two broad races: stream-type populations and ocean-type populations. Puyallup River chinook appears to be relatively well-matched with the description for ocean-type chinook. Ocean-type chinook migrate to sea during their first year of life, normally within three months after emergence from spawning gravel, spend most of their ocean life in coastal waters, and return to their natal river in the fall, a few days or weeks before spawning.

There are differences of opinion regarding the number of chinook populations found in the Puyallup River basin. WDFW, *et al*. (1994) identifies three populations of chinook salmon in the basin, including a spring run in the White River, a summer/fall run in the White River, and a fall run in the Puyallup River. The primary means of discerning between the two White River runs has been administrative, with fish arriving at the COE Buckley fish trap before August 15 classified as spring chinook and fish arriving later designated as summer/fall chinook. In contrast, the Puget Sound Technical Review Team (PSTRT 2001) identified two populations: White River "early-run" and Puyallup "late-run" chinook. In this case PSTRT makes no distinction between the "late-run" fish that utilize the White River from those fish that utilize the Puyallup and Carbon Rivers and their tributaries. Regardless, the status of fall or late run chinook in the Puyallup River basin is considered "unknown" in WDFW *et al.* (1994) due to inconsistent spawner survey data. Recent returns of White River early-run (spring chinook) to the Buckley trap have exceeded escapement goals (1,000 adults), yet their status in WDFW *et al*. (1994) is considered "critical" based upon chronically-depressed spawner abundance. And while significant efforts and results in population rebuilding have occurred for White River and Puyallup chinook, both populations remain below levels that would justify changes in their ESA status.

2.1.2 Evaluating the Proposed Action

The standards for determining jeopardy are set forth in Section 7(a)(2) of the ESA as defined by 50 CFR 402 (the consultation regulations). NOAA Fisheries must determine whether the action is likely to jeopardize the listed species and/or whether the action is likely to destroy or adversely modify critical habitat. This analysis involves the initial steps of: (1) Defining the biological requirements of the listed species; and (2) evaluating the relevance of the environmental baseline to the species' current status.

Subsequently, NOAA Fisheries evaluates whether the action is likely to jeopardize the listed species by determining if the species can be expected to survive with an adequate potential for recovery. In making this determination, NOAA Fisheries must consider the estimated level of mortality attributable to: (1) collective effects of the proposed or continuing action; (2) the environmental baseline; and (3) any cumulative effects. This evaluation must take into account measures for survival and recovery specific to the listed species' life stages that occur beyond the action area. If NOAA Fisheries finds that the action is likely to jeopardize, NOAA Fisheries must identify reasonable and prudent alternatives for the action.

For this emergency action, NOAA Fisheries' jeopardy analysis considered direct and indirect mortality of fish attributable to the action. NOAA Fisheries' habitat analysis considered the extent to which the action impaired the functions of essential elements necessary for migration, spawning, and rearing of the listed salmon under the existing environmental baseline. The potential effects of the emergency action on PS chinook salmon were evaluated based on 1) the biological requirements of PS chinook salmon, 2) the present environmental conditions of the action area, 3) the likely direct and indirect effects of the emergency project on habitat, and PS chinook biological requirements, and 4) the cumulative effects of future non-Federal activities on the likelihood of PS chinook survival. The analysis was based on a review and synthesis of the best available scientific information. Specific sources are listed in the bibliography and cited throughout the body of the document. Primary sources of information included: the BA for the proposed project (COE), the Washington Department of Fish and Wildlife (WDFW), the Washington Conservation Commission (WCC), the PTI, and NOAA Fisheries. Guidance for making determinations of jeopardy is contained in NMFS 1999 and was used in this Opinion.

2.1.3 Biological Requirements

Relevant biological requirements are those necessary for PS chinook salmon to survive and recover to naturally reproducing population levels that would make protection under the ESA unnecessary. Adequate population levels must safeguard the genetic diversity of the listed stock, enhance their capacity to adapt to various environmental conditions, and allow them to become self-sustaining in the natural environment.

Biological requirements are considered habitat conditions that are necessary at any chinook life stage. Essential features of chinook habitat include adequate substrate, water quality (clarity, temperature, chemistry), water quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space and passage conditions. NOAA Fisheries believes substrate, water quality, cover/shelter, and riparian vegetation were the biological requirements affected by this project.

2.1.4 Environmental Baseline

Regulations implementing section 7 of the Act (50 CFR 402.02) define the environmental baseline as the past and present impacts of all Federal, state, or private actions and other human activities in the action area. The environmental baseline also includes the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation, and the impacts of State and private actions that are contemporaneous with the consultation in progress.

The Puyallup River and its two major tributaries, the White and Carbon Rivers, drain an area of 972 square miles. The Puyallup River per se, originates in the Klapatche Ridge area on the southwest slopes of Mount Rainier and flows over 54 miles to its mouth at Commencement Bay, draining an area of 248 square miles. Principal sources are the Puyallup and Tahoma glaciers. The upper Puyallup, above its confluence with the Carbon River is a steep gradient, high-energy stream. The river flows for many miles through steep-walled alluvial valleys and carries a heavy bedload of sediment out of the mountains onto the lower river floodplains. It also carries a high load of suspended sediment, dominated in the spring and fall months by turbidity from fine sediment known as “glacial flour.” On an annual basis, sand and silt compose the greatest transport component compared to gravel transport discharge rates (Sikonia, 1990). The natural tendency of rivers with high sediment loads is to deposit larger material at the upper reaches of their floodplain and the finer materials in the lower reaches, forming braided or meandered channels respectively. The Puyallup River in the project reach can be characterized as braided (JMM, 1991).

Annual average rainfall in the basin ranges from 40 inches at the City of Puyallup to 70 inches at Electron Dam (Puyallup River at River Mile [RM] 41.7). Mountain snowpack has been recorded at up to 150 inches. Eighty percent of this precipitation occurs in the fall and winter months. Sixty percent of the Puyallup basin lies at an elevation between 1,000 and 4,000 feet, an area where neither rain nor snow predominates. This topographical feature often leads to moisture conditions that are capable of generating tremendous amounts of runoff. These flood events normally occur in the winter months and are followed by less severe spring runoffs generated by snowmelt (Washington State Conservation Commission, 1999).

The upper watershed outside Mount Rainier National Park is dominated by logging on Federal and private lands. The river and its tributaries have been severely affected by logging in riparian areas and by sedimentation from extensive road construction, road use and road failures (landslides). Another notable feature in the upper watershed is Electron Dam, located at RM 41.7. Electron Dam was completed in 1903 and began power generation in 1904, creating a complete migration barrier to anadromous fish from its construction until adult fish passage was restored in 2001. Puget Sound Energy (PSE) diverts water (water rights are up to 400 cfs) from the Puyallup River into an 11 mile long flume to an off-channel storage reservoir and discharges flows from its powerhouse back into the river at RM 31.2. Flows in the approximately 10.5 mile by-pass reach are significantly reduced, affecting salmonid production and downstream passage is compromised by inadequate screening and bypass structures at the facility. However, in 1997 the PTI entered into a Resource Enhancement Agreement with PSE that in addition to providing adult passage, resulted in improved minimum instream flows in the bypass reach. Although downstream juvenile passage was included in the agreement, efforts to date by PSE to reduce delays and mortalities of downstream migrant juvenile chinook and coho have been considered unsuccessful by PTI (Blake Smith, PTI, personal communication, 2002).

Land use in the action area is primarily rural residential and forestry. As a result of flood control activities, the river is dominated by a series of dikes, revetments and levees along both banks downstream of the Champion Bridge (RM 28.6) to the river mouth at Commencement Bay. The active channel width throughout this reach is 130 feet (Randy Brake, Pierce County, personal communication, 1999). Extensive changes in the mainstem river channel and throughout the valley floor have reduced the available rearing habitat. The construction of the revetments and levees and their maintenance has precluded properly functioning riparian vegetation. The levees have reduced or eliminated the recruitment of small and large wood from areas most likely to contribute this material. Loss of riparian vegetation has also decreased the contribution of terrestrial prey organisms to the river. Channelization and levees have affected river processes that form pools, side channels and other habitat features used by salmonids. Diking in the lower Puyallup River has actually reduced river capacity and led to a need for additional bank protection and constant gravel removal in attempts to prevent erosion. These activities usually further reduce channel stability and the quality of fish habitat (Washington State Conservation Commission, 1999).

Presently, ongoing efforts are identifying opportunities to remove, abandon or set back levees and other constrictions, as is the case with the emergency project analyzed in this Opinion. Above the Town of Orting, the dike system was severely damaged by storms in 1995 and 1996, with over 20,000 feet of levee washing out. Pierce County as part of their Comprehensive Flood Control Management Plan (JMM, 1991) elected not to repair these damaged levees, some of which are in the project area and instead focused on acquiring now unprotected floodplain areas, and constructing setback protection for some of the existing infrastructure. An earlier setback levee project was initiated as a result of levee damage caused by the same February 1996 flood event. This project, between RM 23.8 and 24.8, was completed in 1998 and, within this restricted reach, resulted in an increase in the active channel width to 800 feet with a maximum of approximately 1,300 feet. In addition, Pierce County has acquired over 900 acres of floodplain in the Puyallup basin from the Champion Bridge to the city of Puyallup (Randy Brake, Pierce County, personal communication, 1999).

Kapowsin Creek is one of only three creeks in the Electron reach of the river which is accessible to salmon (Fiske Creek and Fox Creek are the others). Kapowsin Creek has a drainage area of about 30 square miles over its 14.6 mile length (Williams, *et al.* 1975). The lower reaches have moderate gradient with a good balance of pool and riffle habitats important to salmonid production. Banks are fairly stable and the riparian areas are mixed conifer-deciduous trees in early to mid-successional stages. Kapowsin Creek drains Lake Kapowsin at RM 3.7 and continues for several miles above the lake (at RM 6.4) as Ohop Creek. The watershed above the lake is dominated by rural residential and forest practice land uses.

Kapowsin Creek currently enters onto a left bank bar of the Puyallup River (looking downstream) at a point about 500 feet upstream of where actually it enters the river. This bar affords some protection from Puyallup River flows and its turbid waters during low Puyallup River flows, but because of its low relief it is easily inundated and over-topped when the river flows increase. The creek in the project area is characterized as having mainly a riffle complex with one to two pools greater than two feet deep. The substrate is predominately medium-sized gravel (3-5 inches) suitable for spawning by salmonids. The vegetation onsite is dominated by deciduous tree species, mainly alder and cottonwood, interspersed with Douglas fir and western red cedar. Pre-project LWD was comprised of two downed alder trees of approximately eight inches dbh and one 24 inches dbh cedar tree bridging the channel. The alder trees were removed and repositioned onto the toe of the revetment. The right bank of Kapowsin Creek on the Puyallup floodplain consists of the recently disturbed bar of the Puyallup River. The gravel bar is composed mainly of unconsolidated large cobble and sandy material, and is rapidly being revegetated by cottonwoods and scotch broom. A second overflow channel from Kapowsin Creek starts upstream of the upper end of the project, courses across the bar and rejoins the creek channel near its confluence with the Puyallup River. Because of the dynamic nature of this area, the creek and river conditions described in this section could change substantially depending on the frequency and magnitude of subsequent flood events. High Puyallup River flows are probably the dominant threat to the integrity of the bank adjacent to Orville Road. Kapowsin Creek is not likely to be a significant erosion hazard in and of itself (Paul Bakke, USFWS and Bill LaPrade, Shannon and Wilson; personal communication, 2002).

The project area consists of the area where the revetment was placed as well as the adjacent gravel bar (which was used as a staging area) and the levee and approach area where the access road was constructed. The bank that was protected consists of a bedrock bottom layer including a coal seam. The strata of this formation slopes toward Kapowsin Creek and the Puyallup River. Evidence of bedrock was more apparent progressing to the downstream end of the project. The bedrock strata was not evident on the upper one-quarter of the site to be protected. Overlaying the bedrock layer is a layer of topsoil varying in thickness. It was this layer which was in danger of slipping due to undercutting erosion by the Puyallup River during high flows (Bill LaPrade, Shannon and Wilson, personal communication, 2002). At the very downstream end of the project, the topsoil layer is at least 10 feet above the level of Kapowsin Creek and the Puyallup River. Associated with this high bank is a deep pool at the confluence of the creek and the Puyallup River.

The presence or absence of bedrock also governs the corresponding vegetation adjacent to the creek. In areas where bedrock is present, overhanging vegetation (i.e. within 12 inches of the water's surface) is not present. The only significant overhanging vegetation is found at the upstream end of the project. There is scant riparian vegetation on the Puyallup River bar, primarily one to three year-old alder and cottonwood saplings. Therefore, the riparian vegetation within the project footprint could be characterized as not properly functioning as salmonid habitat. The area along the access road adjacent to the river contains remnant channels from the Puyallup which serve as overflow channels in high flow. The area between the levee and Kapowsin Creek is vegetated with typical riparian species dominated by alder interspersed with mature and immature cottonwood and conifer species and is properly functioning as fish habitat. However, the armored waterward face of the levee is fairly devoid of riparian vegetation, lacks hiding and resting cover and is not properly functioning as fish habitat.

2.1.4.1 Status of the Species Within the Action Area

Adult fall chinook are known to spawn and rear in the Puyallup River upstream of Sumner, and in tributaries including the Carbon River, South Prairie Creek, Wilkeson Creek, Voights Creek, and Clarks Creek (WDFW, *et al*, 1994). Spawning occurs from late August through November, with peak spawning in October. Non-native hatchery chinook releases into the Puyallup River have been made since the late 1970's, primarily with Green River stock. Since 1998, as part of an agreement between the PTI and PSE, in an attempt to restore a self-sustaining fall chinook return, 200,000 sub-yearling chinook salmon, (half of the PTI's total annual propagation number) have been placed into three acclimation ponds above the Electron dam each year. The PTI maintain an interim escapement goal of 400 fall chinook (PTI, 2000). In addition, in 1999 the PTI released 500 surplus hatchery fall chinook adults from Voights Creek Hatchery to areas above the dam and 11 jack chinook were beach seined below the dam and hand lifted above. Stream surveys conducted one to two months following placement above the dam in 1999 identified 97 redds in three streams, Deer, Mowich, and Rushingwater, and the Puyallup River. This program has continued since 1999, and in 2002, 800 chinook were transported above Electron Dam and placed within the mainstem and in Mowich River, Rushingwater Creek and Deer Creek (Eric Marks, PTI, personal communication, 2002). In addition, according to PTI biologists, spawning has in recent years occurred in the mainstem reach immediately downstream of the proposed bank protection project below RM 25.

Fall chinook are also known to spawn in Kapowsin Creek, with returns over the last 10 years averaging 30 spawning fish (Travis Nelson, WDFW, personal communication, 2001). Seven adult spawners and four redds were observed in Kapowsin Creek by the PTI during the 2002 surveys. All chinook spawned above the project, with the first two redds located approximately 100 and 150 feet above the project and the others between the project site and RM 1.6 (Eric Marks, PTI - personal communication, 2002).

Juvenile chinook can be present year round in the project vicinity (Don Nauer, WDFW and Russ Ladley, PTI; personal communication, 2001). Spring chinook are not known to utilize Kapowsin Creek, however spawning is expected to occur higher up in the Puyallup River watershed. Nonetheless, spring chinook juveniles could be rearing in the area at anytime of year (Russ Ladley, personal communication, 2002). No chinook were observed or captured during the dewatering/fish salvage portion of this project in 2002 (Michael Scuderi, COE, personal communication, 2002).

2.1.5 Effects of the Proposed Action

The effects of an action are "the direct and indirect effects of an action on the species together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline" (50 CFR 402.02). Direct effects are the immediate effects of the project on the species or its habitat. Direct effects result from the agency action, and include the effects of interrelated actions and interdependent actions. Future Federal actions that are not a direct affect of the action under consideration (and not included in the environmental baseline or treated as indirect effects) are not evaluated. Indirect effects are defined as "those effects that are caused by the proposed action and are later in time, but are still reasonably certain to occur"(50 CFR 402.02). "Interrelated actions are those that are part of a larger action and depend on the larger action for their justification" (50 CFR 402.02). "Interdependent actions are those that have no independent utility apart from the action under consideration" (50 CFR 402.02).

The habitat functions that have been directly or indirectly affected by the Larson bank protection construction include water quality (temperature, sediment, and chemical contamination), gravel recruitment, LWD recruitment, invertebrate production and stream hydraulics).

Temperature

Salmonids are sensitive to elevated water temperatures at all life stages. Fall chinook salmon prefer water temperatures that range from 10.6-19.4^0 C for spawning migration, 5.6-13.9^0 C for spawning, and 12-14^0 C for rearing (Spence, *et al,* 1996). Elevated temperature can delay migration, reduce available dissolved oxygen, lead to disease outbreaks, and accelerate or retard sexual maturation (Spence, *et al,* 1996). Water temperatures in Kapowsin Creek may be minimally increased by the project until canopy vegetation is re-established. Vegetation removal occurred the entire 160 feet of the project on the both banks of Kapowsin Creek. However the impact was primarily along the left bank, due to the fact that the right bank is essentially an active gravel bar of the Puyallup River and was sparsely vegetated with willow, alder and cottonwood saplings. Several large alder trees (greater than 12 inches dbh, were removed from high on the left bank slope to facilitate rock placement. Ten of these trees were used as LWD on the toe of the revetment.

The pre-project vegetation to Kapowsin Creek provided minimal direct shade during low flow periods since the stream is oriented north/south and the east bank (the gravel bar) had minimal shade producing vegetation. The revetment, disturbed stream banks and the slope above the revetment were re-vegetated with willow; and alder and cottonwood are expected to re-establish naturally. This re-growth should provide some late afternoon shade within approximately 10 to 15 years. Vegetative shading over the short and long term on the east bank is dependent on the frequency and severity of erosive flows from the Puyallup River. Therefore, while there is some potential for short-term impacts to water temperature resulting from this project, over the long-term vegetative shading will be improved over the baseline.

Sediment

Fine sediment introduced into a water body can remain in suspension within the water column for extended periods, depending upon the particle size of the sediment and water volume and velocity. The visual appearance of suspended sediment is measured as turbidity or the ability of light to pass through the suspended sediment. An increase in turbidity is an expression of the amount of suspended sediment in the water column. Suspended sediment may affect fish and filter-feeding macro-invertebrates downstream of the work site. At moderate levels, suspended sediment has the potential to adversely affect primary and secondary productivity; at higher levels, suspended sediment may interfere with feeding and may injure and even kill both juvenile and adult fish (Spence *et al.* 1996, Berg and Northcote 1985).

Sedimentation impacts of this project were minimal as expected. Excavation of the toe-rock trench occurred in the de-watered channel. This project activity, contained within the de-watered section, helped to prevent short-term releases of sediment into the Puyallup River. Some sediment release to the Puyallup River did occur as the project site was re-watered. However, given that the Puyallup River is (and was) extremely turbid during the summer from glacial meltwater, the additional turbidity and suspended sediment released downstream from the project was inconsequential for fish and fish habitat.

As a precaution to further minimize the potential for suspended sediment impacts to fish and invertebrates, the construction work occurred during the summer-work window when adult and juvenile PS salmon were least likely to be in Kapowsin Creek (August 15 to September 1). This window was consistent with WDFW and PTI recommendations (Travis Nelson,WDFW and Russ Ladley, PTI; personal communication 2002). During this window, Puyallup River flows did not overtop the bar and enter the work area, Kapowsin Creek was in a typical summer low-flow condition and rainfall was not an issue. The Puyallup River did rise for two to three days during a hot weather spell and a small amount of river flow entered the project site just before the project start. This small short channel was blocked-off with bar gravel at the start of the project to eliminate turbid river water from the work area and to facilitate stream visibility for salvage of fish from the to-be-dewatered segment of Kapowsin Creek. With the exception of intra-gravel flow from the Puyallup River and some ground water from upslope, the project was constructed in the dry. A downstream gravel berm in Kapowsin Creek was able to contain and settle most suspended sediments before the water entered the Puyallup River.

Chemical Contamination

As with all construction activities, accidental release of fuel, oil, and other contaminants may occur. Operation of the back-hoes, excavators, and other equipment requires the use of fuel, lubricants, etc., which, if spilled into the channel of a water body or into the adjacent riparian zone, can injure or kill aquatic organisms. Petroleum-based contaminants (such as fuel, oil, and some hydraulic fluids) contain polycyclic aromatic hydrocarbons (PAHs) which can cause acute toxicity to salmonids at high levels of exposure and can also cause chronic lethal and acute and chronic sublethal effects to aquatic organisms (Neff 1985).

To minimize the potential for chemical contamination, equipment was to be steam-cleaned and free of leaks and worked within the dewatered reach of Kapowsin Creek. A small staging area was established on the dry river bar. Refueling was to be done at an identified upland location over 150 feet away from the Puyallup River and Kapwsin Creek. The contractor was required to have a spill containment and clean-up plan with adequate containment and clean-up materials available on site. No spills or leaks were observed during the project. Because of these factors, it is unlikely that PS chinook we affected by chemical contamination from this project.

Gravel Recruitment

Streams continuously transport eroded material downstream from areas of erosion to areas of deposition. Transport varies with discharge and is therefore episodic (Kondolf 1994). Armoring streambanks limits lateral channel movement and gravel recruitment (Schmetterling *et al*. 2001). Bank hardening may sequester on-site gravel sources from capture by the active river system and cause downcutting due to increased flow velocities. Downcutting may extend well upstream or downstream, and result in the perching of historic depositional gravel layers above the ordinary high water line, thereby reducing gravel capture rates within the system. The cumulative effect of gravel isolation can lead to loss of enough sources that a stream becomes gravel-limited and not properly functioning as salmonid spawning habitat.

Lost gravel recruitment is unlikely to result from this project. The protected bank is composed of very friable, fragmented rock and coal, none of which is suitable as spawning gravel. The project is essentially built within the Puyallup River channel and the river has a high transport rate of gravel from upstream sources. Therefore, lack of gravel recruitment is not a habitat issue for this project.

Large Woody Debris Recruitment

Large wood is central to determining channel morphology and biological condition (including salmonid habitat quantity and quality) in many Pacific Northwest streams (Spence *et al.* 1996). Pool formation, gravel and organic material retention, velocity disruption, and predatory cover for fish are all habitat functions that are strongly reliant on LWD. Other than natural mortality, sources of large wood recruitment to streams include bank erosion, snow avalanche, mass wasting events, blow down, and transport from upstream (Gurnell *et al.* 1995). The removal of riparian vegetation or prevention of its delivery can simplify aquatic habitat and limit salmonid production by to reducing LWD size, species, and quantities (Schmetterling *et al*. 2001, Spence *et al*. 1996).

The completed project will affect recruitment of LWD at this site and as a consequence, may influence downstream reaches of the Puyallup River. As stated, several large alder trees were upslope of the project and, given the unstable nature of the toe and the face of the slope, had a significant potential to enter the stream. However, these trees were incorporated into the revetment and future recruitment from the slope is doubtful given the proximity of Orville Road. In addition the project was not built as per the agreed-upon plans and considerably more roughness was added to the site than existed before the project. The additional roughness is primarily from large riprap that was placed over the alder trees used as LWD on the flat toe of the revetment, ostensibly to anchor the LWD. What resulted was essentially six large groins placed perpendicular to the bank with dimensions of approximately six feet wide by four feet high by 20 to 25 feet long.

Although this much rock was used without agreement, the groins have increased habitat complexity and will likely facilitate natural site re-vegetation. Roughening the bank toe and face will also likely encourage recruitment and retention of LWD transported to the site from upstream sources, primarily that transported from the Puyallup River. In addition, the flow disruption and energy dissipation that will likely result from the placement of the groins and LWD will allow sediment deposition on the toe. These depositional areas are likely to be quickly colonized by alder, willow and cottonwood. And while it is unlikely that these newly established trees will persist in the event of a thalweg shift of the Puyallup River against the revetment, they may persist for enough years to provide some canopy cover and shade for salmonids at the mouth of Kapowsin Creek. The additional roughness provided by the rock rubble and LWD will also serve to trap and hold post-spawning salmon carcasses (Cederholm *et al.* 1989). Therefore, although long-term LWD recruitment from upslope of the project will not likely occur over the life of the project, the COE has adequately minimized take of PS chinook habitat by constructing LWD features into the bank protection project and providing roughness that may capture and contain LWD from upstream sources.

In addition, a LWD matrix was placed on the active Puyallup River gravel bar to off-set the lack of LWD recruitment as a result of the project. However, the matrix was not built to specifications (location, arrangement on the bar) and may not function as intended to provide fish habitat or to reduce the likelihood of a thalweg shift of the Puyallup River from its current location into the lower end of Kapowsin Creek. It will be necessary to monitor the habitat-forming processes provided by this LWD matrix after high flows have occurred and further analysis is completed to determine if additional minimization measures are necessary.

Invertebrate Production

Instream and terrestrial invertebrates are an important food source for salmonids (Spence *et al*. 1996). Invertebrate production was likely temporarily diminished as a result of this project. In the project area, from the point of diversion to the downstream end of the revetment, the entire channel of Kapowsin Creek was de-watered during the project construction; and it is likely that almost all invertebrates present in the channel were lost. The short-term pulse of suspended solids that resulted when the Kapowsin Creek was redirected through the project site likely did not affect invertebrate production in the Puyallup River, given its high natural turbidity during the time of the project. Aquatic invertebrates quickly recolonize disturbed areas without significant loss of production (Spence *et al*. 1996) as is expected in Kapowsin Creek. Terrestrial insect production will be reduced during the time it takes to re-establish riparian vegetation along the project. Leaf litter that serves as an out-of stream (allocthonous) energy source for Kapowsin Creek, will also be diminished as a result of vegetation removal (Bilby and Bisson, 1990, Cummins, 1980).

But the roughness such as that provided on the bank face and toe of this project will serve to capture and hold in place drifting leaves and small organic detritus on-site for breakdown and processing into the stream ecosystem (Cummins 1974, Spence *et al,* 1996). In addition, it is likely that riparian vegetation will quickly colonize on the terrace provided by the toe of the revetment and add to the vegetation planted during the project. Therefore, there will not likely be any significant effect on invertebrate production as a result of this project in the short term. The environmental baseline for invertebrate production may actually improve over the long term.

Stream Hydraulics

In general, bank protection simplifies streambanks and at high flows, may result in velocity acceleration and channel incision, or displace erosion to another site (Schmetterling *et al*. 2001). Habitat simplification also reduces refugia sites for fish (i.e., undercut banks, debris dams), which salmonids use to avoid predators and maintain position during high flow events. While data indicates habitat use of rip-rapped banks by yearling and older trout species may be equal to or higher than natural banks, use by sub-yearling trout, coho, and chinook salmon is lower (Beamer and Henderson 1998; Peters *et al*. 1998). Size of material is also relevant, as greater fish densities have been generally correlated with larger rock (Beamer and Henderson 1998; Lister *et al*. 1995). Where rock riprap exists, Lister *et al*. (1995) found that embankments roughened by the placement of 1.0 to 1.5 meter diameter rock along the toe of the bank appeared to have greater salmonid rearing densities for all species except yearling steelhead. Alteration of habitat may favor introduced fish species (Schmetterling *et al*. 2001), which may displace or prey upon native species.

This project has been built at a very dynamic geomorphic and hydraulic location at the confluence of Kapowsin Creek with the Puyallup River (Paul Bakke, USFWS, personal communication, 2002). The placement of toe rock (riprap) along a 160 lineal foot segment of streambank, along with rock armoring of the slope, placement of the rock-anchored LWD, and placement of the unanchored LWD will impact stream hydraulics. Several channel behavior scenarios are possible and will result in different PS chinook habitat impacts. One, localized bed and lateral scour of the right bank and bed of the Kapowsin Creek channel at the toe of the project is likely at high flows, either by high Kapowsin Creek flows or by a combination of Kapowsin Creek and Puyallup River flows. This is in part because excavation of the right bank of Kapowsin Creek that was to occur to off-set the channel encroachment caused by the placement of the toe was not done, except at the lower most end of the project. However, since chinook spawning occurred upstream, there will be no direct impact to incubating eggs. Two, a thalweg shift of the Puyallup River to an alignment against the toe cannot be ruled out over time. If that occurs the habitat adjacent to the revetment will be more important as a resting/staging area for PS chinook that enter Kapowsin Creek at a point upstream from the revetment. Or three, both the thalweg of the Puyallup River and the mouth of Kapowsin Creek could shift during high flows. This would leave the revetment isolated from both the river and Kapowsin Creek except during flood flows. Then the effects on chinook would be minimal, since the structure would be isolated from the stream(s), perhaps serving as a high flow refuge.

The LWD matrix that was to be placed on the bar at the downstream end of the damaged levee was intended to facilitate the maintenance of the bar between the Puyallup River thalweg and the current Kapowsin Creek channel and thus minimize the likelihood of a thalweg shift of the Puyallup River towards the revetment. However, since the matrix was placed on the lower portion of the bar it is unclear how the Puyallup River thalweg will respond. This will be evaluated after this winter's high flows to determine if further work is necessary.

Within the action area, given the dynamic nature of the Puyallup River, its relatively wide bankfull width, the relatively short length of the revetment and the abandonment of the levee system in the area, it is difficult to precisely predict up or down-stream channel affects of this project. However, the downstream end of the revetment is keyed into a rock face so there should be no "end-effect" erosion on the left bank. Furthermore, because of the wide flood plain along the right bank, this bank should not be affected by flows that may be redirected from the face of the revetment. Finally, the channel is naturally constrained by rock cliffs just downstream of the project, which effectively dampen further downstream hydraulic effects. Therefore, chinook habitat within the action area should not be significantly affected by this project.

2.1.6 Cumulative Effects

Cumulative effects are defined as "those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation" (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Pierce County is the second-most populated county in the state with over 700,000 residents. Population is likely to increase by 200,000 over the next 20 years (Pierce County, 2002). The county and the 24 cities and towns within its boundaries are required to comply with the State of Washington Growth Management Act (GMA). This includes the development of critical areas ordinances and designation of resource lands for forestry and agriculture. The incorporated cities and Pierce County must also prepare Comprehensive Land Use Plans that direct growth patterns and development standards. Comprehensive Land Use plans are required to concentrate most new growth in already urbanized areas, while allowing less dense development in rural areas. These plans are intended in part to protect fish and wildlife (including ESA listed salmonids and their habitats) while providing for population growth.

Nonetheless, NOAA Fisheries anticipates that some growth in the action area will add to the environmental baseline and affect chinook habitat. These effects are likely to include reduced riparian forests, road construction and stream crossings, additional on-site septic systems, and additional need for bank protection. However, significant progress has been made or is in process to minimize those impacts and to improve degraded habitat in the action area.

For example, Pierce County is in the process of developing a habitat protection and restoration (HPR) regulatory package and this package is now available for public review. This package is intended to improve existing habitat protection laws and activities under the purview of Pierce County. Local regulation changes would address ESA salmonid listings, the State of Washington's Best Available Science Rule, natural hazard mitigation, repetitive loss established through the National Flood Insurance Program Community Rating System Program, and new Washington Department Of Ecology stormwater manual requirements related to the Clean Water Act (Pierce County, 2002).

Although significant habitat impacts have occurred as a result of past forest practices on state and private forest lands, the standards and practices for these activities have improved significantly in the last five years. New state forest practices regulations were promulgated in 2001 as a result of the Forests and Fish Report [FFR]), a negotiation effort between the timber industry, small forest landowners, State of Washington resource agencies, and several Indian tribes. These regulations require substantial improvement in riparian buffers and much improved standards for road construction and maintenance. NOAA Fisheries has included the FFR as Limit 13 in its section 4(d) rule (July 10, 2000, 65 FR 132). While no Limit 13 submittal has been made, it is likely the state will seek long-term Federal assurances under ESA, either via the 4(d) rule or in the form of a Habitat Conservation Plan under section 10(a)(1)(B). These discussions are on-going, with an anticipated completion date of June 2005.

NOAA Fisheries anticipates a reduction in diking in the action area over time. As stated, significant lengths of armored dikes were destroyed in recent flood events and not replaced. This has allowed the river to re-occupy much of its historic flood plain and re-create habitat complexity for PS chinook. Since the 1995-96 flood events over 900 acres of floodplain has been acquired by Pierce County. However, while reduction in the extent of diking, on balance, is positive for the creation and protection of PS chinook habitat, it is likely that erosion will occur along now-unprotected banklines. So it can be anticipated that where there is significant concern for the protection of roads, other infrastructure and property, additional bank protection will be installed. It will be imperative that these projects be well-justified, and designed and constructed in a manner that minimizes impacts to PS chinook.

2.1.7 Conclusion

NOAA Fisheries has determined based on the available information, that the effects of the proposed action are not likely to jeopardize the continued existence of PS chinook salmon. NOAA Fisheries used best available scientific and commercial data in this analysis. The analysis was completed by comparing the expected effects of the proposed action on elements of the species' biological requirements, together with cumulative effects, to the environmental baseline. NOAA Fisheries applied the watershed-based evaluation methodology (NOAA Fisheries 1999) to the proposed action and found that it would cause some reduced function of chinook habitat over the short term. These adverse effects should be minimized over the long-term with the reestablishment of riparian vegetation and placement of LWD along the face of the revetment and on the bar. Therefore, the project is unlikely to have a long term influence on the distribution, numbers, or reproduction of PS chinook.

2.1.8 Re-initiation of Consultation

This concludes consultation for the COE Larson revetment project on the Puyallup River at the mouth of Kapowsin Creek. NOAA Fisheries requires that consultation must be reinitiated if 1) the amount or extent of taking specified in the Incidental Take Statement (ITS) is exceeded, or is expected to be exceeded, 2) new information reveals effects of the action may affect listed species in a way not previously considered, 3) the action is modified in a way that causes an effect on listed species that was not previously considered, or 4) a new species is listed or critical habitat is designated that may be affected by the action (50 CFR 402.16).

2.2 Incidental Take Statement

Section 9 of the ESA and Federal regulation pursuant to section 4 (d) of the Act prohibit the take of endangered and threatened species without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Harm is further defined as significant habitat modification or degradation that results in death or injury to listed species by "significantly impairing behavioral patterns such as breeding, spawning, rearing, migrating, feeding, and sheltering" (50 CFR 222.102). Incidental take is take of listed animal species that results from, but is not the purpose of, the Federal agency or the applicant carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(a)(2), taking that is incidental to, and not intended as part of, the agency action is not considered prohibited taking provided that such takings is in compliance with the terms and conditions of this incidental take statement.

An incidental take statement specifies the effects of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize take and sets forth terms and conditions with which the action agency must comply to implement the reasonable and prudent measures.

2.2.1 Amount or Extent of Take

Puget Sound chinook are likely to be present in the action during a portion of every year and are likely to encounter the effects of this project. Therefore, the completed project is reasonably certain to cause incidental take of PS chinook. Although NOAA Fisheries anticipates a low level of incidental take from the action, the best scientific and commercial data available is not sufficient to enable NOAA Fisheries to estimate a specific amount of incidental take to the species itself prior to the beginning of the emergency action. The number of fish that would be taken cannot be quantified, although the extent to which spawning and rearing habitat is decreased can be estimated. The incidental take authorized in this statement is limited to that which could be caused by the 140 feet of bank protection, and the Kapowsin Creek channel within 200 feet upstream of the bank protection project). No take of PS chinook occurred from worksite isolation procedures used during the construction window and no juvenile or adult chinook were captured or observed in the project area during project construction.

2.2.2 Reasonable and Prudent Measures

Although formal consultation was not completed until after the project was constructed, the COE and NOAA Fisheries did discuss measures to minimize the effects of take on PS chinook. NOAA Fisheries provided the COE with these measures on August 19, 2002. NOAA Fisheries believed these measures were necessary and appropriate to minimize take of PS chinook salmon and to minimize impacts to EFH for PS pink salmon and coho salmon. The NOAA Fisheries believes that the following Reasonable and Prudent Measures (RPMs) are necessary and appropriate to minimize take of the above species. Note that further minimization measures may be required after review of the project subsequent to the 2002-2003 flood season.

1) The COE will minimize take that is likely to result from the departure from the proposed plans by monitoring the project to ensure that the LWD matrix as built is functioning as intended.

2) The COE will minimize take by monitoring the project to ensure that the revegetation efforts are successful.

2.2.3 Terms and Conditions

1) Implement RPM No. 1 as follows:

The COE will conduct a joint site review including NOAA Fisheries, Pierce County, PTI, WDFW, and USFWS after the 2002-2003 flood season but before June 1, 2003 to determine if additional LWD is necessary to be placed at the end of the existing levee as shown on the construction plans. If monitoring reveals to need to redress any shortcomings, the COE shall consult with NOAA Fisheries.

2) Implement RPM No. 2 as follows:

The COE will inspect the survival of trees that were to be planted within the riprap and other areas disturbed during construction to ensure that the revegetation is adequate in terms of species, numbers, distribution and survival. The COE will replant vegetation as needed to ensure at least an 80 percent survival through the year 2004.

3.0 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

3.1 Background

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for those species regulated under a Federal fisheries management plan. Pursuant to the MSA:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (§305(b)(2));
- NOAA Fisheries must provide conservation recommendations for any Federal or State action that would adversely affect EFH (§305(b)(4)(A));
- Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NOAA Fisheries EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (§305(b)(4)(B)).

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting this definition of EFH: Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.10). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

EFH consultation with NOAA Fisheries is required regarding any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the emergency action adversely affected or is likely to adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH.

3.2 Identification of EFH

Pursuant to the MSA the Pacific Fisheries Management Council (PFMC) has designated EFH for three species of Federally-managed Pacific salmon: chinook (*Oncorhynchus tshawytscha*); coho (*O. kisutch*); and PS pink salmon (*O. gorbuscha*)(PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC 1999), and longstanding, naturally-impassable barriers (i.e., natural waterfalls in existence for several hundred years). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). Assessment of potential adverse effects to these species' EFH from the emergency action is based, in part, on this information.

3.3 Proposed Action

The emergency action and action area are detailed above in Section 1.0 of this document. The action area includes habitats that have been designated as EFH for various life-history stages of chinook, coho, and Puget Sound (PS) pink salmon.

3.4 Effects of Proposed Action

As described in detail in Section 1.0 of the Opinion, the action resulted in or may result in short- and long-term adverse effects to a variety of habitat parameters. These adverse effects are:

1. Temporary loss of rearing habitat for PS chinook and coho due to channel dewatering.

2. Loss of PS chinook, PS pinks and coho salmon eggs and alevins in the newly disturbed channel adjacent to the revetment due to short and long-term streambed scour and shifting. Note that in 2002, PS chinook spawned only upstream of the project and that PS pink do not typically return to the Puyallup River watershed in even years.

3. Temporary loss of aquatic insects (a prey base for juvenile salmonids) due to temporary dewatering of Kapowsin Creek, physical loss of existing habitat at the structure placement site and sedimentation of downstream instream habitat during diversion and construction.

4. Temporary loss of terrestrial insects until riparian vegetation is re-established.

5. Temporary increases in suspended sediment as a result of instream excavation.

6. Temporary risk of contamination of waters through accidental spills or leaks of petroleum products.

7. Temporary risk of harassment, poaching or predation of PS chinook, PS pink and coho adults due to lack of riparian cover.

8. Short- and long-term alteration in spawning and rearing habitat for PS chinook, PS pink and coho salmon due to removal of vegetation and physical alteration of the channel along the toe of the revetment.

3.5 Conclusion

NOAA Fisheries concludes that the proposed action would adversely affect designated EFH for PS chinook, coho, and PS pink salmon.

3.6 EFH Conservation Recommendations

Pursuant to Section 305(b)(4)(A) of the MSA, NMFS is required to provide EFH conservation recommendations to Federal agencies regarding actions that would adversely affect EFH. While NOAA Fisheries understands that the conservation measures described in the BA were to be implemented by the action agency, it does not believe that these measures were sufficient to address all of the adverse impacts to EFH described above. Adverse effects to EFH No. 1 through No. 7, as described above, have already occurred and were short-lived or will diminish over the long term as the site revegetates and no longer pose a threat to EFH. However, NOAA Fisheries recommends that the COE implement the following conservation measures to minimize adverse effect to EFH of chinook, coho and PS pink salmon identified in No. 8 above:

1. Conduct a joint site review including NOAA Fisheries, Pierce County, PTI, WDFW, and USFWS after the 2002-2003 flood season but before June 1, 2003 to determine if additional LWD is necessary to be placed at the end of the existing levee as shown on the plans.

2. Inspect the survival of trees that were to be planted within the riprap and other areas disturbed during construction to ensure that the revegetation is adequate in terms of species, numbers, distribution and survival. The COE will replant vegetation as needed to ensure at least an 80 percent survival through the year 2004.

3.7 Statutory Response Requirement

Pursuant to the MSA (§305(b)(4)(B)) and 50 CFR 600.920(j), Federal agencies are required to provide a detailed written response to NOAA Fisheries' EFH conservation recommendations within 30 days of receipt of these recommendations. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. In the case of a response that is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

3.8 Supplemental Consultation

The COE must reinitiate EFH consultation with NOAA Fisheries if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920(k)).

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